

REMARKS

Claims 1-50 are pending in the present application. In the Office Action dated November 22, 2004 the Examiner rejected claims 1, 2, 4-9, 11-17, 19-23, 25-31 and 38-50 under 35 U.S.C. 103(a) as being unpatentable over PCI System Architecture, Third Edition, by Tom Shanley, U.S. Patent No. 6,098,158 to Lay et al. and Intel Application Note AP-758 'Flash Memory PCI Add-In Card for Embedded Systems' ("AP-758"). Claims 3, 10, 18, 24, 43 and 49 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shanley, AP-758, and Lay as applied to claims 2, 9, 17, 23, 39, and 46 above, and further in view of U.S. Patent No. 6,256,692 to Yoda et al. Claims 28-37 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shanley, Lay, AP-758, and Yoda.

The disclosed embodiments of the invention will now be discussed in comparison to the prior art. Of course, the discussion of the disclosed embodiments, and the discussion of the differences between the disclosed embodiments and the prior art subject matter, do not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

The disclosed embodiments include an apparatus and method for storing and restoring a machine state of a computer system. In this manner, relatively immediate operation of the computer system upon power-up can be made available, thereby avoiding the need to wait for the typical power-up sequence and boot routine to complete. The apparatus and methods described are for capturing and restoring a machine state of a computer system having a central processing unit (CPU) coupled to a memory via a first bus, and further having a second bus coupled to the first bus to provide communication with the CPU and the memory. The apparatus includes a PC card coupled to the second bus and having a non-volatile memory for storing machine state information corresponding to the machine state. The PC card further has *a controller coupled to the non-volatile memory to control the storing of data therein* and the retrieval of data therefrom. The apparatus also includes *a transfer component for directing the controller to coordinate with the CPU access to the non-volatile memory and the memory to store and download the machine state information for capturing and restoring, respectively, a corresponding machine state of a computer system.*

The embodiments disclosed by Applicants in particular, those emphasized in italics above, provide important non-obvious advantages over the cited art. One important advantage is that *a controller* is provided, which is a dedicated piece of hardware that includes a

transfer component for directing the controller to coordinate with the CPU access to the non-volatile memory and the memory. (See Figure 2). Because of this particular configuration, the machine state storage and retrieval functions need not be provided by an additional application, such as an operating system, or to be called from an running application. In addition, because a PC card is configured with a Flash memory, the machine state information can be readily transferred from one machine to another, which provides a significant advantage in terms of portability and ease of a system administrator (e.g., a human) to reboot the state of one machine on a completely different machine, so long as the different machine also as the controller and the ability to operate with flash memory.

The cited art does not teach or suggest these features, nor the desirability of the advantages that are derived therefrom, and hence does not teach provide any motivation to do what applicants have done.

Shanley. The Examiner has cited Shanley for describing the combination of a CPU coupled to a first bus and a memory connected to the first bus, and PC card coupled to a second bus and the CPU. Applicants admit that there is nothing new about this configuration of computer architectures. This is like saying Shanty discloses a CPU. Neither Applicants nor anyone is suggesting there is anything novel about PC card architecture. Applicants note however, that Shanty does not disclose *a controller coupled to the non-volatile memory to control the storing of data therein* and the retrieval of data therefrom with a *transfer component for directing the controller to coordinate with the CPU access to the non-volatile memory and the memory* to store and download the machine state information

AP758. The examiner cited AP758 for disclosing a PC card coupled to a non-volatile memory. Again, Applicants admit there is nothing new about connecting a PC card to non-volatile memory. Applicants note however, that AP758 does not disclose *a controller coupled to the non-volatile memory to control the storing of data therein* and the retrieval of data therefrom with a *transfer component for directing the controller to coordinate with the CPU access to the non-volatile memory and the memory* to store and download the machine state information

Lay. The Examiner cited Lay for teaching storing machine sate information in a non-volatile memory and a controller coupled to the non-voltaite memory for coordinating with the cpu access to the non-volatile memory and the memory to store and download machine state information for capturing and restoring, respectively, a corresponding machine state of a computer system. Applicants respectfully disagree with this characterization of Lay. Nowhere

does lay teach such a controller. What Lay in-fact teaches, is a software application that executes the transfer functions. More specifically, Lay teaches that the "...the computer system begins at a given point during execution of software application. In response, the application generates a request to create a boot image." See column 2, lines 47-51. "According to the invention, the fast boot process may be initiated by any particular software application (an "initiation" application) at any arbitrary point during the execution of that that application. One or more boot images may be saved in association with a particular initiating application." See column 4, lines 29-33. "Preferably, this routine is implemented in software at the operating system level." See column 4, line 42. Thus, all the transfer features for storing boot images taught by Lay are executed from an application, *not from a controller*.

Moreover, as the Examiner appears to recognize, nowhere does Lay teach that machine state information should be stored in a non-volatile memory on a PC card. In-fact, Lay only teaches that boot image data is stored on dedicated location on the disk drive. "Further, storage of the boot image is not restricted to any particular location in disk storage. Rather the boot image is dynamically relocatable as necessary for memory management." See column 2, lines 36-40. "After the routine determines the size of physical and critical memory then in use, an area of disk storage is then allocated at some then-available position or offset within that storage." See column 2, lines 51-54. "According to the present invention, a boot image is saved in disk storage and used to restore system upon a given occurrence...." See column 4, line 21-23.

The Claims and rejections thereof. Turning now to the claims, each of original independent apparatus claims 1, 9, 16, 22, and 28 recite in pertinent form, "...a *controller coupled to the non-volatile memory for coordinating with the CPU access to the non-volatile memory and the memory to store and download the machine state information for capturing and restoring, respectively, a corresponding machine state of a computer system* in light of the above remarks. In addition, independent method claims 38 and 45 are presently amended to recite the controller and its functions. Accordingly, Applicants traverse the Examiner's rejection of the claims on grounds of obviousness.

First, the cited art does not teach all of elements claimed by Applicants, more specifically, none of the cited art teaches the controller and its functions emphasized in italics above. Therefore, Applicants request withdrawal of the rejections of the independent claims and all the claims that depend thereon based on this missing element alone from the prior art.

Second it is respectfully submitted that the Examiner's rejection is based on a hindsight analysis of the prior art in view of what Applicants disclose. More specifically, the Examiner has taken a "parts" approach to find references describing various parts recited in Applicant's claims, and asserted a justification for combining the references to reconstruct Applicants' invention that is not based on the teachings of the references alone.

In particular, the examiner finds a motivation to combine Shanley, AP758 and Lay by stating that it would be obvious to use the PCI computer system described by Shanley with a PC card having non-volatile memory as described by AP758 with the fast boot system described by Lay "in order to allow the system to function as an embedded system, because the PCI bus presents an easy to implement interface that can use current chipset technologies from the host processor bus, has good performance, industry standard protocols, and provisions for system boot control and to allow the system to boot up faster.

Applicants respectfully submit that this is not a specific motivation to combine references, but rather a statement about the advantages of PC card generally. The Examiner's reasoning is akin to saying because PCI cards have certain advantages, it would obvious to combine PC cards with anything procedure (e.g., the boot image saving procedures described by Lay) to get the advantages inherent to PC cards. In-fact, there is nothing in Lay that specifically teaches anything that would motivate one of ordinary skill in the art to store and retrieve machine state information in non-volatile memory connected to a PC card. Nothing in Lay teaches anything about storing machine state information anywhere but in disk storage. There is nothing in Lay that teaches or suggests that the memory that holds the machine state should be a portable memory, such as in a flash memory configured with the PC card described by Ap758. Indeed, Lay teaches that the boot image process is particularly useful for "mission critical" computer performance, i.e., for re-booting a critical computer, therefore one of ordinary skill in the art would not think to use a portable memory provided with PC cards configured with flash memory, to reboot the same computer after a crash. Rather, Lay only suggests storing boot image data on a section of the hard disk. Accordingly, there is nothing in Lay that specifically states anything whatsoever, that would motivate one of ordinary skill in the art to specifically look to a PC card connected to a non-volatile memory, as a way to store machine information.

Indeed, if anything, from the teaching regarding PC cards and Lay, one of ordinary skill in the art might be motivated away from using PC cards and flash memory to store machine state data. Flash memory is particularly designed to be a removable and therefore portable type of non-volatile memory. Lay teaches the importance of having "mission critical"

back-up, so one of ordinary skill in the art would think it is important that the boot data be non-removable so as to always be available for the mission critical functions of the machine.

Miscellaneous items. Claim 5 has been amended to recite "non-volatile" memory to clarify the original intent of the claim, which was implicit but inadvertently omitted in the original claim.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,

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Enclosures:

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Fee Transmittal Sheet (+ copy)

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